

STATE OF WISCONSIN OPERATION & MAINTENANCE MANUAL PURAFLO® PEAT FIBER BIOFILTER





CLASS I NSF/ANSI STANDARD 40

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1.0 GENERAL DESCRIPTION OF SYSTEM

The Puraflo® Peat Fiber Biofilter is an advanced secondary treatment system that purifies septic tank effluent to an extremely high degree before final dispersal.

A typical Puraflo® Peat Fiber Biofilter system consists of:

- → Septic tank with a commercially-rated effluent filter connected to the tank outlet pipe
- → Dosing tank and effluent pump, or siphon, to accommodate dosing of the septic tank effluent onto the peat fiber media
- → Biofilter modules where advanced treatment occurs due to the physical, chemical and biological
- → processes that are optimized in the peat fiber media.
- → Site specific, final effluent dispersal system

The filtered septic tank effluent is collected under gravity in the pump tank. A timed-dose system is activated by a programmable timer or a siphon-dose system triggers, which pumps the effluent through a flow splitting inlet manifold located at the base of the treatment modules. An orifice plate is located inside the top of each inlet manifold which allows the flows to be split equally and fed simultaneously to each Biofilter module. The inlet manifold is connected to the base of the Biofilter module and is fed upwards to a rectangular distribution grid located 15cm (6 inches) below the top of lid. The effluent percolates laterally and vertically through the depth of the peat fiber treatment media and emerges as a clear, innocuous liquid from the base of the system. The treated effluent is then collected and dispersed.

The Puraflo® Peat Fiber Biofilter System has been tested, certified and listed by the National Sanitation Foundation, International as meeting the requirements of NSF/ANSI Standard 40, Class 1. Puraflo® is a modular system with each module rated for 150 gallons per day (gpd). The range and rated capacity of the system is therefore a multiple of the standard unit based on the 150 gpd per module. Model P150N*3B, incorporating 3 modules and rated at 450 gpd, was the treatment plant tested to NSF/ANSI Standard 40.

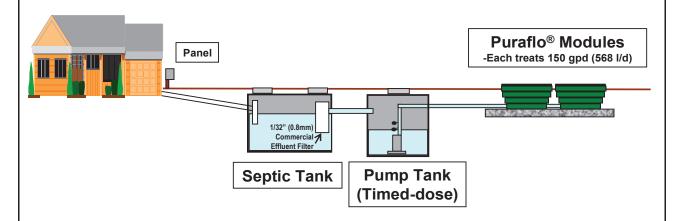
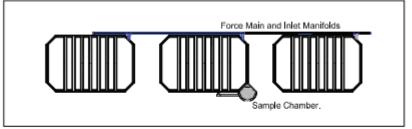


Figure 1. Typical Puraflo[®] schematic (shown without drainfield)



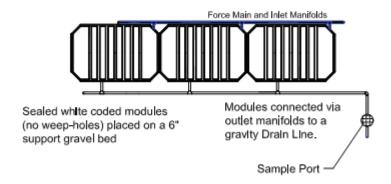
1.1 Type A & Type B Installation

TYPE A - PAD INSTALLATION.



Blue coded modules with weep holes and one green coded module with sampling chamber, drain into a stone Pad for final treated effluent disposal. Pad dimensions can be selected to match site conditions and modules can be installed side by side as well as end to end (as shown above)

TYPE B - PIPED OUTLET INSTALLATION.



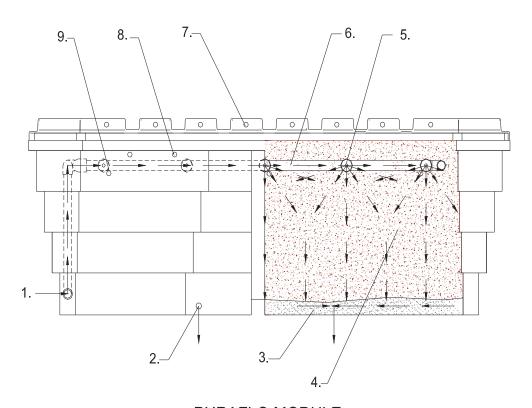
The site specific design will detail the final effluent disposal method.



1.2 Specification of Puraflo® Module

Max Treatment Capacity per Module150 gpdModule Length7' 1"Module Height2' 6"Module Width4' 6"Module Weight≈1800 lbs

ITEM	DESCRIPTION
1	INLET
2	OUTLET PORT
3	#5 STONE
4	PEAT FIBER MEDIA
5	DISTRIBUTION ORIFICE
6	DISTRIBUTION GRID
7	VENT HOLES
8	ROPE HANDLE HOLES
9	STABILIZER BARS



PURAFLO MODULE



2.0 BASIC OPERATION & MAINTENANCE REQUIREMENTS

At each Puraflo® inspection, the Authorized Service Provider shall (at a minimum) perform the activities listed below.

2.1 Observe & Monitor

- → Effluent level in all tanks
- → Septic tank outlet filter or screened pump vault for clogging
- → Watertightness of tanks, risers and pipe connections at tanks
- → Operation of pumps, floats valves, electrical controls and alarms
- → Pumping frequency from impulse counters and elapsed run time meters
- → Peat modules for any structural damage, accessibility, adequate ventilation, excess odors, insect or other pest infestations
- → Vegetative growth over the drainfield
- → Drainfield area for surfacing of the effluent
- → Sample of peat biofilter effluent collected form the sampling point to check for effluent clarity and odor (note: peat biofilter effluent may have a brackish to straw color from the humic and fulvic acids naturally present in the peat fiber media)

2.2 Measure & Report

- → Sludge and scum levels in the septic tank
- → Sludge level and grease presence in the pump tank
- → Pump delivery rate (drawdown test)
- → Dosing volume and measure or calculate average pump run time

2.3 Notification of Service/Repair Requirements

The Authorized Service Provider shall alert the system owner in a timely fashion of needed maintenance or repair activities including, but not limited to, landscaping, tank sealing, tank pumping, pipe or control system repairs, media replacement, and adjustments to any other component.



3.0 MAINTENANCE CHECKLIST

System Component	Description	O&M Frequency
		Minimum Annually
Septic Tank	Confirm Manhole Lids are secure.	Х
	Confirm effluent filter is in place.	X
	Clean effluent filter.	X
	Confirm satisfactory condition of risers.	X
	Confirm satisfactory condition of pipe.	X
	Record wastewater level in tank.	X
	Record sludge level in tank.	X
	Record scum level in tank.	Χ
	Confirm water-tightness of tank connections.	Χ
	De-sludge Septic Tank (if required).	Χ
Pump Tank	Confirm Manhole Lids are secure.	X
i unip iunik	Record wastewater level in tank.	X
	Confirm water-tightness of tank.	X
	Confirm satisfactory condition of risers.	X
	Confirm satisfactory condition of pipe connections.	X
Pump	Confirm pump is accessible and removable.	X
Fullip		X
	Confirm pump is operating satisfactorily.	X
	Confirm floats are operating satisfactorily.	
	Confirm pump valves are operating satisfactorily.	X
	Record the condition of floats, control panel & alarms	X
	Record pump readings.	X
	Record Elapsed Time meter Readings.	X
	Examine and Record Timer Settings.	X
Control Panel	Record the condition of control panel & alarm.	Χ
	Record pump readings.	X
	Record Elapsed Time meter Readings.	X
	Examine and Record Timer Settings.	Х
	Confirm alarm is working.	Х
Sample chambers	Confirm satisfactory condition of sample chamber.	Х
·	Extract effluent sample.	X
	Conduct odor and visual inspection of sample.	X
Piping	Confirm satisfactory condition of force main.	Х
	Confirm satisfactory condition of manifold.	X
	Confirm satisfactory condition of orifice plates/connections.	X
	Committed data actory contained to common places commissions.	~
*Peat Media	Record the condition of the peat.	Х
i Gat Migula	Examine peat for insect or pest infiltration.	X
	Check for evidence of continuous ponding on media surface.	^
	Confirm distribution grid is level.	Χ
	Confirm even distribution of wastewater within modules.	
		X
	Confirm that the ventilation holes around the top of the module are free from obstruction.	Х
	nee nom obstruction.	v
Desirefield	Ohaali farasiidaa aa afassifaa saatii 15 saatii	X
Drainfield	Check for evidence of surface water diversion.	X
	Check for evidence of ponding/surfacing of effluent.	X
	Check for excessive vegetative growth over drainfield.	X
	Confirm stability of percolation area.	X

^{*}Under normal operating conditions it is not necessary to remove the lids of the Puraflo® module however, it is recommended that a visual inspection is undertaken annually.



4.0 PERIODIC REMOVAL OF SOLIDS

A well maintained septic tank is essential for most on-site treatment systems as the septic tank provides the first step in wastewater treatment (also called primary treatment). During use, the heavier solids settle to the bottom forming a sludge layer while the lighter solids, greases and oils float to the top to form a scum layer. The anaerobic conditions created in the septic tank by the scum layer allow anaerobic and facultative microorganisms to break down (feed on) and reduce the sludge and scum volume. In this manner approximately 40 percent of sludge and scum volume can be reduced. However, the remaining solids accumulate in the tank and must be pumped out on a regular basis.

The septic tank (and occasionally the pump tank) should be inspected annually and pumped in accordance with State and Local guidelines. Depending on use, a typical home will produce sufficient sludge requiring the septic tank to be pumped every 2 to 10 years. The importance of desludging can not be overemphasized since the Puraflo® system is designed to treat effluent from a well functioning septic tank where a significant portion of insoluble solids have been allowed to settle out. The effluent filter installed with the Puraflo® system should be cleaned annually or at the time of system inspection. The inspection/desludging should be carried out by a qualified septic pumper and should not be attempted by the homeowner.

Note: A filter is installed on the septic tank outlet pipe to prevent the carryover of solids to the treatment system. If septic tank maintenance recommendations and practices are not followed and in particular, if large objects are disposed into the septic tank, the filter will clog causing wastewater to backup into the house.

5.0 PURAFLO® EFFLUENT – SAMPLING & ANALYSIS

5.1 Treated Effluent Quality

When treating domestic strength wastewater (300 mg/l BOD $_5$ or less) up to the design flows and loads, a properly maintained Puraflo $^{\circ}$ Peat Fiber Biofilter system will exceed the performance requirements of NSF Standard 40 Class 1. Actual NSF test results established through analytical methods described in NSF/ANSI Standard 40 averaged 2mg/l cBOD $_5$ and 2 mg/l TSS.

PARAMETER	NSF Std 40 Avg, 30-day	Puraflo [®] Effluent Avg
cBOD₅ (mg/l)	25	2
TSS (mg/l)	30	2
pH (pH units) range	6 - 9	6 - 7.5

Additional NSF testing results are reproduced in the following table.

PARAMETER	Puraflo [®] , Avg
Total Nitrogen	>70% reduction
NH ₃ -N (mg/l)	<1
Fecal Coliform elimination	99.9% removal

The pH, cBOD₅ and Suspended Solids (TSS) concentrations demonstrated in this table will be attained within a few weeks of commissioning and will be consistently achieved over the lifetime of the peat fiber media.



5.2 General Requirements for Sampling

- → Where required by State and Local regulation the following describes the correct methods for collecting and transporting an effluent sample to an accredited laboratory.
- → The person responsible for sampling (here after referred to as the sampler) should preferably have a technical background, and where possible, be familiar with the workings of the Puraflo® system.
- → Personal safety should be the first consideration of the sampler. The sampler should wear protective clothing, eye protection and sterile disposable gloves at all times. The gloves should be discarded immediately after sampling i.e. one pair of gloves per sampling event. This safeguards against cross contamination of samples. Always wash hands after sampling.
- → All samples shall be obtained, preserved and analyzed in accordance with the guidelines outlined in EPA's document 40 CFR 136.
- → All samples for inorganic analysis (i.e. BOD, TSS) should be collected into polyethylene sampling containers (or equivalent). All samples for microbiological analysis should be collected into sterile plastic containers (or equivalent). Different laboratories provide different sampling containers.
- → The volume of sample required for proper analysis varies according to the test performed. Confer with the local laboratory to establish the volume requirements needed based on the total number of parameters requiring analysis.
- → All sampling containers should be clearly labeled to include, as a minimum, the following information:
 - ✓ A unique sample identification number
 - ✓ The source/location of sample collection
 - The date and time the sample was collected
 - The name of the sampler responsible
 - ✓ The name of the treatment system owner
 - All parameters requiring analysis
- → All samples must be properly stored during transportation to the laboratory. This usually involves cooling the sample and storing it in the dark (away from sunlight) to inhibit further biochemical reactions.
- → All time sensitive samples must be delivered to the laboratory within 6 hours of sampling. Therefore, travel time, laboratory operating hours, weekend or holiday schedules all need to be considered with any sampling program.
- → The laboratory responsible for analysis should be certified or accredited and have a chain of custody and quality control/quality assurance system in place.

5.3 Puraflo® Sampling Protocol

- → Put on protective clothing, eye protection and gloves where required.
- → Locate and remove the lid of the sampling chamber, exposing the effluent discharge pipe below. Typically, there should be a slow steady drip of effluent from the discharge pipe. Do not force flow through the system by running the pump on manually operation.
- → Clean the discharge pipe to remove any residual solids or a 'slimy growth'.
- → Once the effluent is free flowing, carefully place the mouth of the sample bottle directly under the falling stream of effluent. Be careful not to touch the discharge pipe with the mouth of the sample bottle. If the sampling bottle is too tall to fit under the discharge pipe, a 'dipping device' may be required. Please ensure that the dipping device is thoroughly cleaned and sterilized before sampling
- → Refill the container almost to the top, leaving approx. 1-5% of the container volume to allow for thermal expansion during transportation. It may take 10 to 20 minutes to acquire the needed volume prescribed by the accredited lab.
- → If a microbiological sample is required, a sterile plastic container (or equivalent) should be used. Carefully remove the lid of the sampling container using the thumb and forefingers. Fill the bottle to



the top, and replace the lid immediately. Do not rinse the bacteriological sampling container, fill it only once, being careful not to allow your hands to come into contact with the rim of the container. Extreme care must be taken because even a properly collected sample can become contaminated.

- → Label all sampling containers with the following information:
 - A unique sample identification number
 - ✓ The source/location of sample collection
 - The date and time the sample was collected
 - ✓ The name of the sampler responsible
 - The name of the treatment system owner
 - All parameters requiring analysis
- → Note any unusual occurrences during sampling.
- → Remove the protective gloves and dispose of carefully.
- → Store all samples in ice-packs (or equivalent) for transportation to the lab.
- → Store all samples in the dark.
- → All time sensitive samples should be delivered to the laboratory within 6 hours of sampling. All samples should be analyzed on the same day as sampling.

5.4 Visual & Odor Inspection

The Puraflo® system should produce an effluent that is virtually clear of suspended solids, however, the effluent may sometimes have a slight brown-yellow color due to varying concentrations of naturally occurring organic compounds (humic & fulvic acids; tanins) which are occasionally leached out of the peat.

The system should produce an effluent with virtually no odor, although a slight earthy smell may be detectable on occasions.

If the system is producing an effluent which gives off an offensive odor or that which contains a high concentration of suspended solids, then the system may be experiencing difficulties and troubleshooting should be carried out.

6.0 REPLACING SYSTEM COMPONENTS

6.1 Replacing the Pump

Equipment required: Screwdriver/Wire Ties/Pliers/Gloves/Replacement pump

- → Isolate Main Power
- → Unwire Pump
- → Remove pump tank manhole cover
- → Disconnect force main piping
- → Extract pump (pull-rope/pull-chain)
- → Remove wire from conduit
- → Remove force main piping from pump
- → Discard of spent pump in accordance with proper regulatory handling and disposal rules
- → Connect force main piping to replacement pump
- → Install wiring in conduit
- → Lower pump back into original position
- → Reconnect force main piping
- → Reconnect power the system



- → Go to control panel
- → Switch from automatic to manual to activate the pump
- → Carry out drawdown test
- → Make timer adjustments as required.
- → Return control panel to automatic setting
- → Close control panel and secure
- → Secure manhole cover back in place

6.2 Replacing the Float(s)

Equipment Required: Screwdriver/Wire Ties/Pliers/Gloves/Replacement Float

- → Isolate Main Power
- → Unwire float connection to control panel
- → Remove pump tank manhole cover
- → Remove defective float and replace
- → Secure manhole cover back in place
- → Reconnect float connection to control panel
- → Reconnect main power

6.3 Replacing the Control Panel/Alarm

Equipment Required: Screwdriver/Wire Ties/Pliers/Gloves/Replacement Panel

- → Isolate Main Power
- → Unwire inlet power from control panel
- → Unwire pump connections from control panel
- → Unwire float(s) from control panel
- → Disconnect inlet conduit
- → Unscrew control panel from mounting bracket
- → Discard of spent control panel pump in accordance with proper regulatory handling & disposal rules
- → Mount new control panel
- → Reconnect inlet conduit
- → Rewire float(s) connections
- → Rewire pump connections
- → Rewire inlet power
- → Reconnect main power
- → Switch control panel from automatic to manual to activate pump
- Remove the manhole cover from the pump tank
- → Raise alarm float in pump tank to test alarm
- → Secure manhole cover back in place

6.4 Replacing the Peat Fiber Media

Note: Peat fiber replacement should only be carried out under the direct supervision or control of the manufacturer or authorized representative. All peat is not the same and only peat fiber provided by Bord na Móna should be used. Replacing media without correcting potential problems may lead to a shortened lifespan.



Needed...

- → Apply for repair permit (if required)
- → Contact your local authorized distributor to oversee the project.
- → Contact local authorized distributor to order the replacement peat fiber.
- → Backhoe, skid loader, or other equipment to lift approximately 1500 lbs. of peat fiber.
- → Pump truck to pump partly-dry material (and #5 rock) or equipment to remove peat from site by hand
- → Two workers w/ pitchforks & shovels
- → Approved land application area, landfill, or sewage treatment plant w/ drying bed for disposal.
- → 1/2" wrench
- → Water source with hose to reach module area
- → Minimum 150 lbs. of clean septic stone or #5 gravel to fill bottom of each module
- → Replacement peat fiber media from Bord na Móna

Process...

- → Remove lids
- → Remove distribution grid
- → If using a pump truck, add water as needed (plug effluent line for type B systems)
- → Pump or shovel out all peat fiber media
- → Ensure that drain holes are open & flowing (the piped outlet system will have two open holes on one side & two plugged holes on the other)
- → Run pump to ensure that the inlet piping is free flowing
- → Place a minimum of 150 lbs. #5 gravel over outlet holes & in module drain channels
- → Place first layer of peat fiber media in modules up to 2nd step in plastic module & compact
- → Place and compact second layer of peat fiber media to grid level
- → Replace grid, ensuring that it is strapped to cross bars with stainless steel straps
- → Ensure the gird is level
- → Activate pump to confirm equal distribution within the module and between the modules
- → Place final layer of peat fiber media to top of module and level out. DO NOT compact/step on grid
- → Replace lids and secure with the four bolts provided
- → Perform draw down test & verify that the control panel is set properly

Note: Ensure that the peat fiber removed from the modules is disposed of in accordance with State and Local regulations.



7.0 TROUBLESHOOTING CHECKLIST

DETECTION	POSSIBLE CAUSE	ACTION
Experience slow-flush but electrical system is operational	Unacceptable level of solids in septic tank	Pump out septic tank and clean effluent filter
	Effluent filter blocked	Clean effluent filter
Alarm sounds continuously and effluent level rises steadily in the pump tank - this can eventually lead to slow-flush caused by sewage backing up and could eventually cause effluent to pond at the septic or pump tank	Pump failure due to circuit breaker switch being tripped to the "off" position by an electrical storm or power surge Pump fails due to faulty electrical system or pump is faulty	Conserve water usage, reset circuit breaker and test the alarm - if the problem recurs call your Authorized Service Provider Conserve water usage and call your Authorized Service Provider
Alarm sounds periodically but resets itself (indicating that the pump is still operating) Note: Some states require alarms that are latched (continue to alarm after the alarm event has been corrected) and will not auto-reset themselves in which case it will be necessary to reset the alarm manually	High water usage above design capacity activates the alarm float switch Leaking plumbing fixtures Leaking pump or septic tank Broken timer or incorrect timer settings Latched alarm	Reduce water usage to range within the design capacity Repair leaking plumbing fixtures Repair leaks in septic or pump tank Conserve water usage and call your Authorized Service Provider Reset manually
No alarm warning - effluent level rises continuously in the pump tank potentially leading to slow-flush and/or effluent ponding around septic or pump tank	Pum p and alarm failure due to circuit breaker switches being tripped to the "off" position by an electrical storm, power surge or power failure Pum p and alarm fail concurrently due to faulty system electrics	Reset circuit breaker and test the alarm - if the problem recurs call your Authorized Service Provider Conserve water usage and call your Authorized Service Provider
Ponding of effluent on peat fiber media	Failed drainfield Media at end of useful life	Consult with your Authorized Service Provider Replace peat fiber media and dispose of spent peat media per local regulations



APPENDIX 1 - CHECKLISTS

INSPECTION CHECKLIST

GENERAL DETAILS						
Client Details						
Name						
Address						
State/Zip						
Phone No.						
ORC Name						
Address						
State/Zip						
Phone No.						
Site Details						
Address						
State/Zip						
No. of Bedrooms						
Systems Details						
No. of Occupants						
No. of days (p.a.)						
dwelling is						
occupied No. of Modules						
Type of System (✓)	Pad	_		Trench	_	
Type of System (*)	rau			Hellon		
Comments						



SEPTIC TANK						
Is Septic Tank accessible?	Yes		No			
Are Manhole Lids Secured?	Yes		No			
Is effluent filter in place?	Yes		No			
Does effluent filter need cleaning	Yes		No			
Record Wastewater Level in Tank						
Record Sludge Level in Tank						
Record Scum Level in Tank						
Date of last de-sludging.						
Does Tank need de-sludging?	Yes		No			
Water Tightness of Tank Satisfactory?						
Condition of Risers Satisfactory?						
Condition of Pipe Connections Satisfactory?						
General Comments						

PUMP TANK							
Is Pump Tank accessible?	Yes		No				
Are Manhole Lids Secured?	Yes		No				
Is effluent filter in place?	Yes		No				
Record Wastewater Level in Tank							
Record Sludge Level in Tank							
Record Scum Level in Tank							
Is there Sludge carryover?	Yes		No				
Is grease present in pump tank?	Yes		No				
Water Tightness of Tank Satisfactory?	Yes		No				
Condition of Risers Satisfactory?	Yes		No				
Condition of Pipe Connections Satisfactory?	Yes		No				
General Comments							



PUMP								
General	General							
Is pump	Is pump accessible and removable?					No		
Is pump operating satisfactorily?				Yes		No		
Are floats	s operating satisfa	ctorily?		Yes		No		
Are valve	s operating satisf	actorily?		Yes		No		
Drawdov								
Result of	Drawdown Test							
Were res	ults of drawdown	test satisfa	ctory	Yes		No		
Timer								
On Settir	ngs	/	min O	ff Settings			/hr	
Pump Re								
	livery Rate			Pump Delivery Dose				
Last Pum	np Reading (A)			Date of Last Pump Reading (C)				
Current F	Pump Reading (B)			Date of Cu	irrent Reading	(D)		
Differenc	e (X) i.e. (B-A)			#Days in F	Period (Y) i.e. (E	D-C)		
X/Y =		Dose pe	er Day		Gal/Min			
	_	X			X		• "	
\vdash	Dose per Day	Drawdo	own =	Gal/min	Timer =		Gal/day	
ETM D								
ETM Rea				D (()	(ETMD !!	(0)		
	Reading (A)				t ETM Reading			
	TM Reading (B)				rent Reading (I			
	e (X) i.e. (B-A)			#Days in Period (Y) i.e. (D-C)				
Average	(X/Y)	Harman	- Davi		O al /rasira			
X/Y =		Hour pe	грау		Gal/min X			
	Hour per day Drawdown = Gal/min 60min/hr = Gal/day							
General	Comments						•	



	ALARM
Alarm Condition	
No. of Times alarm has activated	
Reason for activation	

WATER METER (if applicable)									
Water Supply Well Municipal									
Water Meter Readings									
Water Meter Reading (A)			Date of Last Reading (C)						
Last Water Meter Reading (B)			Date of Cur	rent Reading (I	D)				
Difference in Readings (X) (i.e. A-B)			#Days in Pe	eriod (Y) i.e. (D	-C)				
Average flow per day (X/	Average flow per day (X/Y)								

PEAT MODULES				
Modules				
Are the modules accessible?	Yes	No		
Any structural damage evident?	Yes	No		
Adequate ventilation?	Yes	No		
Any excess odors?	Yes	No		
Any effluent overflow?	Yes	No		
Is condition of berm satisfactory?	Yes	No		
Peat N.B Only in the event that serious problems have been encountered with components of the Puraflo system should the lids of the modules be removed.				
Condition of Peat OK?	Yes	No		
Any insect or pest infestation?	Yes	No		
Any ponding on media surface?	Yes	No		
Is there even distribution?	Yes	No		
Is distribution grid level?	Yes	No		
General Comments				

DRAINFIELD				
Drainfield Type	Pad		Trench	
Any surface water diversion?	Yes		No	
Any ponding/surfacing effluent?	Yes		No	
Any excess vegetative growth?	Yes		No	
Is percolation area stable?	Yes		No	

FORCE MAIN				
Is condition of mainline satisfactory?	Yes		No	
Is condition of manifold satisfactory?	Yes		No	
Is condition of orifice plates OK?	Yes		No	
Are connections OK?	Yes		No	
General condition satisfactory?	Yes		No	

MONITORING SYSTEMS				
Condition of Sample Chamber OK?	Yes		No	
Is Sample appearance OK?	Yes		No	
Is Sample smell OK?	Yes		No	
Condition of Monitoring Wells OK?	Yes		No	
Drainfield Ports (level) OK?	Yes		No	
Were samples taken?	Yes		No	
Type of Samples	Influent		Effluent	

INSPECTION COMPLETION			
General Comments			
		_	
Inspected By:		Date	
Customer Signature:		Date	